

DESCRIPTIONS OF THE IMMATURE STAGES AND OVIPOSITION BEHAVIOR OF  
*PYRRHOGYRA OTOLAIS* (NYMPHALIDAE)

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**ABSTRACT.** The morphology and behavior of the immature stages of *Pyrrhogyra otolais* (Nymphalidae) are described. The early stages are compared with those of *Pyrrhogyra crameri*. An unidentified species of *Serjania* (Sapindaceae) is the larval host plant in Ecuador. The oviposition behavior and habits of the adults are discussed.

**Additional key words:** Ecuador, larva, pupa, *Serjania*, Sapindaceae.

The entirely neotropical genus *Pyrrhogyra* Hübner encompasses between nine and twelve species (D'Abbrera 1987) distributed from Mexico through Central and South America, with the highest diversity in northern South America. At least four species occur in our study area. Our current understanding of species relationships within this genus is poor (D'Abbrera 1987) and larval descriptions and hostplant relationships will provide useful information for correctly separating species. Adults are fast flyers and are frequently encountered in forest light gaps where they feed on dung, fruit (DeVries 1987) and carrion (pers. obs.). Known host plants are all within the family Sapindaceae (DeVries 1987) and the larvae show close behavioral and morphological affinities to such genera as *Catonephele* Hübner, *Nessaea* Hübner, *Callicore* Hübner, *Diaethria* Billberg, *Temenis* Hübner, *Eunica* Hübner, and *Epiphile* Doubleday (DeVries 1987).

*Pyrrhogyra otolais* Bates is distributed from Mexico to Peru, and seems confined to wet forests of lower elevations. Despite this widespread butterfly's formal description nearly 150 years ago, its early stages and hostplant relationships have remained undescribed. This study presents observations on hostplant use, larval morphology and behavior, as well as oviposition behavior.

#### MATERIALS AND METHODS

All observations and rearings were conducted at the La Selva Biological Station located in the Sucumbios providence of eastern Ecuador. The station is located approximately 75 km east-south-east of Coca at an elevation of approximately 250 m. All studies were conducted adjacent to the oxbow lake Garza Cocha. The forest in this area is predominantly intact, though some areas have been clear-cut for coffee and manioc plantations.

On 14 November 1997, at 1330, two female *P. otolais* were observed to oviposit on a small seedling of an unidentified species of *Serjania* Mill. (Sapindaceae).

Six eggs and a second instar were collected by cutting off the leaves to which they were attached. Larvae were reared in individual plastic cups. Fresh leaves were added and frass was removed semi-daily. Subsequently, larvae in various stadia were found and reared in a similar fashion. Vouchers of each stadium were preserved. Seven larvae were reared to adults. All head capsules, pupal exuviae, and vouchers are in the personal collection of the senior author.

#### RESULTS

**Larval host plant.** *Serjania* sp. (Sapindaceae) is the larval host plant of *P. otolais* at our study site in eastern Ecuador. The strikingly colored, new, red leaves of this plant are easily seen in light-gap areas of the forest and in the forest understory. New leaves are present from November to January. The fact that adult *P. otolais* are present for most of the year in this area and can be quite common, suggests that adults are fairly long-lived.

**Oviposition behavior.** Upon locating a potentially suitable oviposition plant, the two observed females began flying rapidly in tight circles around the plant. During this period they landed on leaves of any plant in the vicinity. After several minutes they began landing more and more frequently on the host plant. While on the plant they walked about for several seconds rapidly tapping their forelegs on the leaf. After a single egg was laid, they repeated the rapid flight and leaf-tapping sequence for about 30 seconds before laying another egg. Eggs were always laid singly on the fresh red leaves of new shoots, but multiple eggs were eventually placed on the same leaf. Most commonly, eggs were placed dorsally along the mid-rib of the leaf, but were occasionally placed at the base of the petiole or on the stem nearby.

**Egg.** (n = 20+, Fig. 1a). Pale-yellow to white, darkening slowly after being laid, shape a truncated cone with strong longitudinal ridges and many closely spaced cross

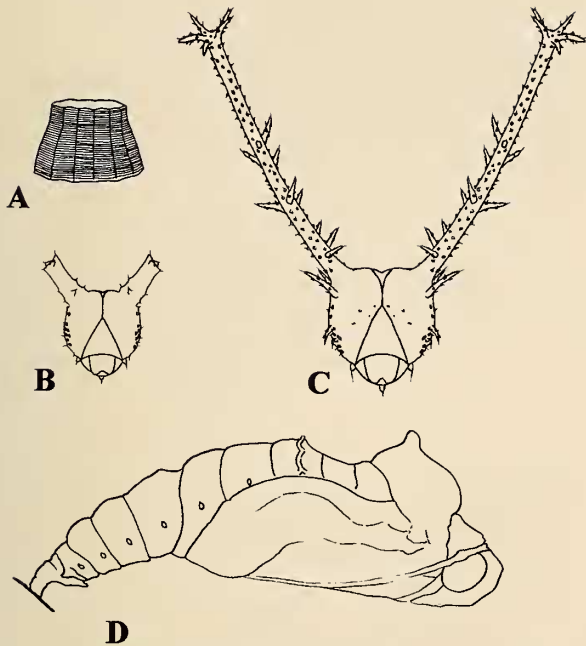


FIG. 1. Egg and larval head capsules of *P. otolais*. (a) egg; not drawn to scale (b) Second instar (c) Fourth instar (d) Pupa; not drawn to scale.

ribs, a slight constriction near the top gives them almost a bell shape. First instars hatch by flipping open the entire top of the egg like a lid. Larvae were never observed to eat the egg shell upon emergence.

**Larva.** *First instar* ( $n = 6$ ). Head dark brown and devoid of scoli; body light yellow with dark setae. *Second instar* ( $n = 9$ , Fig. 1b). Head black with dorso-lateral scoli; body same color as first instar, all segments with pairs of short, rounded scoli dorsally, all with bulbous tips, brown at base and white at apex; A7 and A8 with middorsal scoli formed by rosettes of 3 and 5 spines respectively. *Early third instar* ( $n = 7$ ). Head black with dorso-lateral scoli curving backwards, each scolus with several irregularly placed chalazae along the shaft and ending in a rosette of five spines, shaft of each scolus white immediately below apical rosette; body dull yellow, T3–A6 dorsally dark greenish-gray color with fine white patterning; A1–A6 with a pair of small white spots dorsally on either side of midline, all segments with dorsal, bifid scoli on either side of midline forming a row along the body, similar rows of single scoli laterally and ventro-laterally; T1 with single middorsal scolus; T2 with three-pronged middorsal scolus; T3 with five-pronged middorsal scolus; A2–A8 each with single, bifid, middorsal scolus; A9 with middorsal rosette of four scoli; A7 with middorsal, three-branched scolus in addition to the bifid scolus; A8 with additional five branched scolus; all scoli black and sparsely covered with small chalazae. *Late third instar* ( $n$

$= 7+$ ). Similar to early third instar but with orange bodies, dorsal portions of T3–A7 pale yellow with dark brown markings. *Fourth instar*. ( $n = 10+$ , Fig. 1c) Head as described for third instars; body as above with the addition of small, single scoli near the base of each proleg. *Fifth instar* ( $n = 17$ ). Head bright orange except for the scoli and all spines, no white patch below the rosette at the tip of the scoli; body differs from fourth instar in being more brightly orange and the dorsal areas of segments T3–A7 bright yellow with dark brown or black markings.

**Pupa.** ( $n = 11$ , Fig. 1d) Mostly lime-green with brown markings along the ridges, cremaster dark brown, strong thoracic keel coming to an abrupt peak around the mesothorax, strong ridge along the dorsal edge of the wing pads extending onto the head and eyes, another strong ridge across the dorsum of the second abdominal segment. All individuals that pupated in the laboratory did so on the side of the container and were attached at nearly right angles to the sides of the container but curved downward. Only one pupa was found in the field, and this was attached to the near-horizontal surface of the hostplant leaf.

**Larval behavior.** Typical of other nymphalid genera, first and second instar larvae rest on "frass chains" built from the edge of the leaf (DeVries 1987, Otero & Aiello 1996). Later instars rest along the midrib of the leaf when not feeding. They rest with the head oriented towards the apex of the leaf, and angled so that the scoli project forwards. When disturbed, larvae rear back onto their prolegs and thrash wildly about, occasionally raising their terminal abdominal segments simultaneously.

#### DISCUSSION

As noted for other species of *Pyrrhogyra* (DeVries 1987), the early stages of *P. otolais* show affinities to the early stages of other sapindaceous feeders such as *Temenis* Hübner and *Epiphile* Doubleday (Nymphalidae). First, second, and early third instars are almost identical to those of *P. crameri* Aurivillius, which can be found during the same time of year in this area. *Pyrrhogyra crameri* larvae, however, feed on *Paullinia* Linn. (Sapindaceae). The second and third instars can be separated from those of *P. otolais* by the presence of only three spines in the middorsal rosette of segment A8. The behavior of these two species while resting as larvae on their host plant and as adults is very similar. Adults of both species are seen frequently patrolling light gaps, usually perching several meters from the ground.

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#### LITERATURE CITED

- D'ABRERA, B. 1987. Butterflies of the Neotropical Region. Part III. Brassolidae, Acraeidae, & Nymphalidae (partim.). Hill House, Victoria, Australia.
- DEVRIES, P. J. 1987. The butterflies of Costa Rica and their natural history, Vol. 1, Papilionidae, Pieridae, Nymphalidae. Princeton Univ. Press, Princeton, New Jersey.
- OTERO, L. D. & A. AIELLO. 1996. Descriptions of the immature stages of *Adelpha alala* (Nymphalidae). J. Lepid. Soc. 50:329-336.

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